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Determining when a hospital admission of an older person can be avoided in a sub-acute setting: A systematic review and concept analysis

Abstract

Objective

To conduct a systematic review of the evidence for when a hospital admission for an older person can be avoided in subacute settings. We examined the definition of admission avoidance and the evidence for the factors that are required to avoid admission to hospital in this setting.

Methods

Using defined PICOD criteria, we conducted searches in three databases (Medline, Embase and Cinahl) from January 2006 to February 2018. References were screened by title and abstract followed by full paper screening by two reviewers. Additional studies were searched from the grey literature, experts in the field and forward and backward referencing. Data were narratively described, and concept analysis was used to investigate the definition of admission avoidance.

Results

A total of 17 studies were considered eligible for review; eight provided a definition of admission avoidance and 10 described admission avoidance criteria. We identified three factors which play a key role in admission avoidance in the subacute setting: *(1) ambulatory care sensitive conditions and common medical scenarios for the older person*, which included respiratory infections or pneumonia, urinary tract infections and catheter care, dehydration and associated symptoms, falls and behavioural management; and managing ongoing chronic conditions; (2) *criteria/tools*, referring to interventions that have used clinical expertise in conjunction with a range of

general and geriatric triage tools; in condition-specific interventions, the decision whether to admit or not was based on level of risk determined by defined clinical tools; and (3) *personnel and resources,* referring to the need for experts to make the initial decision to avoid an admission. Supervision by nurses or physicians was still needed at subacute level, requiring resources such as short stay beds, intravenous antibiotic treatment or fluids for rehydration and rapid access to laboratory tests.

Conclusion

The review identified a set of criteria about which ambulatory sensitive conditions and common medical scenarios for the older person can be treated in the subacute setting with appropriate tools and resources. This information can help commissioners and care providers to take on these important elements and deliver them in a locally designed way.

Introduction

The National Health Service (NHS) in England is treating more patients than ever before, with hospitals experiencing increases in the use of emergency and non-urgent inpatient and outpatient services, in particular for older people.[1] Emergency bed use is influenced by access to and availability of services in the community, hospital services and the way in which hospital services are managed.[2] Available evidence suggests that if people receive appropriate, timely diagnostics and care in the community they will not require inpatient care.[3] Indeed, estimates from the literature on emergency admissions suggest that between 20 and 30% could have been avoided if appropriate alternative forms of care had been available or if care had been managed better in the period leading up to the admission.[4] It will thus be important to identify those who need care but do not have a medical need that requires hospital admission.[5]

Relatively few admissions are identifiably inappropriate at the time of admission.[6] One of the most important factors for preventing admission to hospital is ensuring that there is high-quality expert decision-making as early in the process as possible, especially for older patients.[7] Health professionals also need to have easy and rapid access to alternative services and diagnostics,[4,7] with primary, community and acute care appropriately aligned to enable coordinated working.[2] There are examples where this has been shown to be effective, such as community-based ambulatory medical units for acute assessment and rehabilitation.[3] These and other community-based schemes were found to successfully identify many individuals for whom they can make a strong case that an admission was prevented, yet evidence of impact of such schemes at population level remains difficult to establish.

In this review we focus on the subacute setting, which we define as services located at the interface between primary care and hospital care and which have been designed to reduce admissions by providing a mid-point of care between the hospital and community with a higher level of diagnostic testing and treatment than standard primary and community care. We focus on studies from Organisation for Economic Co-operation and Development (OECD) countries as these are most likely to applicable to such services in the UK.[8] In addition, our research supports the aims of the OECD by bringing together relevant evidence across these countries. Our aim was to investigate the evidence for when a hospital admission for an older person can be avoided in subacute settings. We examined the definition of admission avoidance and the evidence for the factors that are required to avoid admission to hospital in this setting. We provide an overview of what is currently known about this developing area of service provision in terms of the key challenges of reducing avoidable admissions for older people. By drawing together the available evidence, this review provides an initial platform for a growing body of knowledge on the developing area of subacute services, to help inform clinicians, purchasers and providers about the most effective components of a subacute service to reduce unnecessary admissions.

Methods

We carried out a systematic review (please see the Online supplement for the full working protocol).

Eligibility criteria

We included studies that met out PICOD criteria. Thus, studies had to describe a **p**opulation or participants aged 65 years or older who had experienced admission avoidance **i**nterventions in subacute settings. We did not use an *a priori* definition of admission avoidance as defining this was one of the outcomes of the review. As noted above, we defined subacute services as services at the interface between primary and secondary (hospital) care. Included studies may or may not have used a comparator or **c**ontrol group. Our **o**utcomes of interest were (i) a definition of admission avoidance and/or (ii) information on how the admission avoidance decision was made, including any evidence describing the process of hospital admission avoidance decision making and the criteria applied to achieve the decision. As such, outcomes of interest were either the components of such a process and or how they were applied. Only outcomes regarding admission avoidance in relation to acute hospitals were of interest. We included investigative studies of any **d**esign conducted in OECD countries.[8]

Exclusion criteria

We excluded studies that described planned or elective care, or alternative services within the secondary hospital setting, including the emergency department. We did however include emergency department alternatives that function alongside the secondary hospital setting. We excluded randomised studies of admission avoidance in the subacute setting which randomised people with similar needs to different care pathways rather than by type and/or severity of their condition.

Searches

We composed a parent search strategy in Medline using relevant keywords and index terms and modified searches accordingly across the Medline (and Medline in process), Embase and Cinahl databases (Online supplement). Databases were searched for the period January 1st, 2006 to 16 June 2016; searches were updated twice (19 June 2017 and 26 February 2018). Reference lists of included papers were screened and forward referencing using Google Scholar performed to identify other relevant papers. We also searched the grey literature using hospital admission or admission as search terms for studies published by selected organisations in the UK and the USA, as well as the World Health Organization (see Online supplement for the full list). Additionally, we contacted two UK experts on admission avoidance identified both from our previous research (Online supplement).

Data management and extraction

References were managed in Endnote. References were dual screened by two reviewers (AH, BD), first by title and abstract and then as full papers using the eligibility criteria noted above. We dual-screened the first 500 references according to our eligibility criteria and adjusted them subsequently to ensure consistent decision-making on papers to be included. We developed a data extraction form to record data on source, such as author, reference, and results or findings relevant to our question. Definitions of admission avoidance were extracted into a separate table.

Data presentation and analysis

Data were analysed using a narrative approach. We did not quality appraise individual papers as our aim was not to assess the efficacy of interventions but

instead to define admission avoidance and the features of such services in the subacute setting. Identified definitions were discussed in a consultation meeting with researchers, clinicians (general practitioners, geriatricians) and commissioners of services, who are members of a local partnership of acute and primary/community health care providers, a clinical commissioning group and two universities in the South-West of England.[9] The consultation was conducted in December 2016 and involved feedback on initial findings of the review around defining avoidable admissions and how we might measure them. In a further step, we used the framework proposed by Walker and Avant to identify the key defining attributes of the concept of 'avoidable admissions' and develop an operational definition.[10] One author (AH) applied the Walker and Avant framework to the definitions of admission avoidance identified, which comprises seven steps: identifying the concept, determining the purpose of the analysis, defining the concept and its uses, determining the critical attributes (by word frequency analysis), constructing the cases, identifying the antecedents and consequences and defining the empirical referents[10] This process was checked and discussed by all the authors.

Results

We identified a total of 17 studies that met our inclusion criteria (Figure 1).[11-27] Eight studies provided a definition of admission avoidance[11-18] while 10 studies assessed interventions using specific hospital admission avoidance decision-making criteria for older people in the subacute setting.[14,19-27] One study described an example of admission avoidance criteria and also provided a definition of admission avoidance.[14]

Defining avoidable admission for older people in the subacute setting

Table 1 presents identified definitions of avoidable admissions. Three studies defined the concept in subacute settings[12,13,17] while the remaining five studies did not specify a particular setting. Applying the Walker and Avant framework detailed above we identified the definition provided by Sundmacher *et al*.[12] as most comprehensive in terms of the key attributes captured (Table 2). On this basis, we discussed and modified it to develop a definition that is relevant to older people in the subacute setting. (Box 1)

Hospital admission avoidance decision-making criteria for older people in the subacute setting

Studies describing specific hospital admission avoidance decision-making criteria for older people in the subacute setting included two randomised controlled trials[19,20], one controlled trial[17], two pre and post studies[21,24] and five cohort studies (three prospective and two retrospective).[22,23,25-29] Studies were conducted in the United Kingdom [19,22,25,26], Spain[25,27], the United States of America [20,23] and Australia.[17,21] (Table 3) Interventions included Hospital In the Nursing Home schemes, with studies analysing data of older people residing in a nursing home who had signed up to the scheme.[17,20,22,23] The intervention linked nursing home staff with hospital nursing staff in a model of cross-organisational working. Nursing home staff worked with predefined decision-making criteria for common acute conditions and exacerbations of chronic conditions with the aim of keeping nursing home residents out of hospital. Snooks *et al.*[19] looked at paramedics attending people in their own homes following a fall. The intervention introduced a new custom-made clinical decision flow chart used by paramedics to determine whether a person should be admitted to hospital. Five studies investigated short-stay acute care centres,[22,24,27] a day hospital acute

care service[25] and an outpatients department acute care service[26], all using predefined hospital admission avoidance decision-making tools.

We identified three factors which play a key role in admission avoidance in the subacute setting: (i) *ambulatory care sensitive conditions/common medical scenarios for the older person*; (ii) *criteria/tools used to inform decision making;* and (iii) *personnel and resources*. We discuss each of these in turn.

Ambulatory care sensitive conditions/common medical scenarios for the older person

Conditions and common medical scenarios for the older person that were cited in papers for potential admission avoidance were: respiratory infections, including community acquired pneumonia[17,19,23,27]; urinary tract infections and catheter care[17,19,21,23]; dehydration and associated symptoms[17,19,22,23]; falls[19,21,25]; and behavioural management.[25,26,27] Three studies focused on specific conditions (chronic obstructive pulmonary disease, community acquired pneumonia and pulmonary thromboembolism); here, the decision whether to admit or not was based on determination of level of risk.[25,27]

Criteria and tools

Interventions typically used clinical expertise in conjunction with a range of general and geriatric triage tools, such as the triage classification system.[28] However, studies did not always provide sufficient detail on the tools that were used. For example, Hullick *et al.* stated they had used 20 evidence-based algorithms but did not provide any detail.[21]

Snooks *et al*., in their study of paramedics attending people in their own homes, used a specifically devised protocol to assess older people following falls, with the option of leaving them in their own home with referral to community supportive service or admission to an acute hospital.[19]

Turning to condition-specific studies, Huertas *et al*.[25], who examined the effectiveness of a respiratory day hospital to reduce admissions for exacerbation in patients with severe chronic obstructive pulmonary disease, used the Global Initiative for Chronic Obstructive Lung Disease (GOLD) system.[29] They classified mild and moderate chronic obstructive pulmonary disease to require a change of treatment of inhaled medication and moderate corticosteroids and antibiotics respectively, and that any escalation on that should be considered severe and the patient should be hospitalised. A study of outpatient imaging for pulmonary embolism to reduce admissions[26] used the Pulmonary Embolism Severity Index (PESI) to determine the level of risk for pulmonary embolism, with high risk patients being hospitalised.[30] Likewise, Noval Menendez *et al*.,[27]in their study of the appropriateness of short stay medical units for people with community acquired pneumonia, used published criteria to inform subsequent action, that is whether the patient can be treated with oral antibiotics in their own home or in a subacute setting or whether they should be hospitalised. [31]

Personnel and resources

Most included studies noted that experts were needed to make the initial decision on whether or not an individual should be admitted, with expertise applied in different ways. For example, the Hospital In the Nursing Home model involved nursing home

staff who are trained and supported by emergency care nursing staff at the acute hospital who also coordinated the scheme.[17,19,21,23] Other interventions also used specialised staff or trained up staff to decide on admission, for example, falls training for paramedics[19], or they used multidisciplinary approaches, such as the Comprehensive Geriatric Assessment within an Acute Care for Elders unit.[24] In condition-specific interventions, senior doctors administered the initial decision-making tools.[25-27] However, where the decision was made that patients did not require acute hospital care, that is, they were not admitted to hospital, they still required observation and treatment, involving supervision by nurses and physicians. Provision of these services at the subacute level requires resources, such as short stay beds, intravenous equipment for antibiotic treatment or rehydration, or rapid access to laboratory tests.

Discussion

This systematic review examined the definition of admission avoidance and the factors that are required to avoid admission to hospital in the subacute setting. It identified factors that play a key role in admission avoidance, namely a range of ambulatory care sensitive conditions and common medical scenarios for the older person, the criteria and tools used to inform decisions, and the personnel and resources needed. From the evidence synthesised here we draw four main implications for policy and practice: (i) subacute care can provide easy and rapid access to diagnostics; (ii) prospective identification of at-risk patients allows for earlier intervention and reduces the risk of subsequent admission; (iii) clear protocols and criteria can assist staff in decision making around risk, particularly relating to specific conditions; and (iv) expert decision making by specialised staff needs to take

place early in process but does not necessarily have to be consultant-led. We discuss each of these points in light of our findings.

Previous research provides evidence for the efficacy and safety of admission avoidance schemes for older people from RCT evidence with a similar profile of conditions identified in our current review. [3] This RCT evidence found that care outside hospital is generally comparable to inpatient care in terms of outcomes such as readmissions and, most importantly, safety and mortality. Similar conclusions were drawn in a review of hospital at home interventions as an alternative to acute hospital inpatient care, which found mortality and risk of readmission to be comparable between settings.[33] It was further noted that when the costs of informal care were excluded, admission avoidance hospital at home may be less expensive than admission to an acute hospital ward. This RCT evidence helps to support the idea that sub-acute care, positioned earlier in the care pathway and providing easy and rapid access to services and diagnostics can provide cost-effective patient care and potentially admission avoidance.

In terms of criteria and tools used to assess acute illness and exacerbations of chronic conditions in the subacute setting, we found these to be comparable to those used in acute care and that both our review and previous work highlight the utility of prospective identification of at-risk populations.[34] We find this to be most commonly used in nursing home admission avoidance interventions and those involving paramedics in falls interventions. It highlights the importance of appropriate level of ongoing care for older people using clear protocols and criteria to assist staff in the community in order to maintain health and prevent them requiring acute care and potential hospital admission.

Our review also suggests that the best approach of managing an acutely unwell older person in the subacute setting included initial assessment and treatment led by specialist or specifically trained care professionals. Subsequent care is likely to be general nursing care. These conclusions are supported by studies of interventions that place geriatricians in the emergency department and found these to improve patient outcomes and the processes of care.[35,36] Specialist care may not necessarily mean senior physician-level care however. For example, a recent cohort study of the impact of transitional care nurses based in the emergency department in the USA, who were trained in evaluating functional and cognitive impairment, physical frailty, and medical complexities common in older adults, found this intervention to be effective in reducing the risk of hospital admission.[37]

The studies included in this review are pragmatic and they do not provide high quality evidence for effectiveness and safety outcomes for admission avoidance interventions. An ongoing multi-site randomised open trial of geriatrician-led admission avoidance hospital at home in the UK is likely to provide more robust evidence than the evidence presented in this review on alternative models of health care for older populations.[38]

Strengths and limitations

This review was initiated from a collaboration between community geriatricians in Bristol and researchers at the University of Bristol. It was conducted following robust methodological guidance and it is focused on the highly topical area of admission avoidance and care alternatives for the older population. Admission avoidance schemes have been comprehensively studied in community and secondary care settings but less so at the interface setting of subacute care.[3, 33,34,38]

However, there are a number of limitations to the review. First, there are likely to be definitions of admission avoidance in the literature that are not easily identified using standard searching and screening methods. Equally, there are no standard searches for admission avoidance in subacute settings. While we defined the subacute setting as outside secondary hospital services, we acknowledge that this definition is not always clear-cut, with many hospital alternatives services being available. It may have been beneficial to have firstly identified a definition for an avoidable admission, then to have explored the key factors that play a part in avoiding this type of admission.

Conclusion

In conclusion, this systematic review defines avoidable admissions in the older population and describes important factors around admission avoidance in the subacute setting. It provides predominantly observational evidence to supports the role of subacute care in hospital admission avoidance. There is a clear picture as to which ambulatory sensitive conditions and common medical scenarios experienced by older people can be treated in the subacute setting with appropriate tools and resources. We highlight the key elements to be considered in the design of these services, which can then be tailored to the needs of the local population.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and material

All included papers are available as open access or from the authors. Any additional information is available from the authors

Competing interests

None of the authors have any competing interests to declare

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